

**Fact Sheet: Main Energy Plant Emissions and Impacts****Background**

The University of Minnesota has rebuilt the Old Main Heating Plant – now called the Main Energy Plant – located northwest of East River Road in Minneapolis. As with any project that can emit air pollution, an air quality permit amendment and an Environmental Assessment were required before construction of the new plant could begin.

The permit process took about two years. The process included the documentation of potential emissions, the combined heat and power technology, the plant’s potential impact on the surrounding air quality, and the potential health risk to the community. Permit approval was granted at a public meeting of the MPCA Citizens’ Board in January 2015.

**Maximum Emissions**

As shown in Table 1, maximum emissions from the University’s heating plant will be reduced after the Main Energy Plant begins operation. The Main Energy Plant will burn natural gas as the primary fuel in a turbine similar to those used in airplanes, replacing coal use at the Southeast Plant. In addition, the Main Energy Plant will use catalytic converters to control both carbon monoxide (CO) and nitrogen oxide emissions (NO<sub>x</sub>).

**Table 1. Comparison of Maximum Hourly Emissions (Pounds per Hour)**

Unit Description	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>
<b>AFTER MAIN ENERGY PLANT OPERATES</b>				
Main CHP Maximum	20.4	9.7	2.0	0.7
Southeast Maximum after Main is Constructed	91.5	131.7	37.9	363.7
<b>TOTAL Main CHP + Southeast Maximum</b>	<b>111.9</b>	<b>141.4</b>	<b>39.8</b>	<b>364.4</b>
<b>EXISTING SOUTHEAST</b>				
Southeast Maximum Before Main is Constructed	149.6	477.1	71.5	484.0
<b>NET CHANGE (Pounds per Hour)</b>	<b>-37.7</b>	<b>-335.6</b>	<b>-31.6</b>	<b>-119.6</b>

**Ambient Air Quality Impacts**

The Minnesota Pollution Control Agency required the University to model maximum Main Energy Plant emissions to measure worst-case air quality impacts as part of the Environmental Assessment Worksheet for the project.

The model:

- Used five years of hourly weather data for Minneapolis;
- Assumed maximum emissions of all pollutants from the plant, every day of the year; and,
- Found the maximum hour of impact point every 100 meters and every 10 degrees surrounding the plant. (The maximum could be from different days at each point).

The single point of maximum one-hour impact was:

- Compared to National Ambient Air Quality Standards (NAAQS). The predicted maximum one-hour impact was found to contribute less than 4% of NAAQS for all regulated pollutants (see attached Table 2); and,
- Used in a Health Risk Assessment model created by the MPCA and Minnesota Department of Health (MDH) to estimate risk from all pollutants.

**Health Risk Analysis**

The Health Risk Analysis (HRA) estimated potential risks at the point of maximum impact. The results were compared to what are called Hazard Indexes. The Indexes are used to determine if the estimated project risk is high enough to require more detailed analysis and/or if additional pollution control equipment is required.



The model included the following types of health risks:

**Acute Non-Cancer Impacts.** These are short-term impacts from inhaling the pollutants. Calculated impacts are estimated for pregnant mothers and fetuses, as well as potential impacts on developing children.

**Chronic Multi-Pathway Non-Cancer Impacts.** These are long-term impacts from breathing, skin contact and eating the pollutants.

**Cancer Impacts.** These are long-term (70-year) impacts from breathing, skin contact and eating the pollutants over the lifetime of the plant. The MPCA follows MDH guidance to ensure that the toxicity values are protective of early life (childhood) and fetal sensitivity to carcinogens.

For the Main Energy Plant, the worst-case impacts were as follows:

**Table 2. Comparison of Health Risk Assessment v. MPCA / MDH Benchmarks**

Hazard	Percentage of Hazard Index <sup>1</sup>	Pathway
Acute Inhalation	3.4%	Inhalation
Chronic Inhalation	1.1%	Neurological
Chronic Multi-pathways	2.0%	Urban Gardener
Cancer Multi-pathways	0.82%	Urban Gardener

<sup>1</sup> The Hazard Index is a benchmark for maximum potential population risk to health impacts. The Minnesota Index benchmark is an increased probability of one additional impact per 100,000 people.

Since the HRA estimated that health risk was well below MPCA/MDH benchmarks, the MPCA concluded that “health effects from the proposed action (MEP) are unlikely to occur, or will be negligible.”

### Combined Impacts

As a final step in the Main Energy Plant permitting process, the Southeast plant was modeled to show the community the existing worst-case air quality impacts. The results were also used to show the change in air quality after the new plant began operation and the two, old coal-fired boilers were retired at the Southeast Plant. Table 3. shows the estimated change in air quality at the CDC before and after the Main Energy Plant project:

**Table 3. Comparison of Air Quality Impacts Before and After MEP**

Pollutant	Old Southeast Worst-Case 1- Hr Concentration <sup>1</sup> (µg/m <sup>3</sup> )	Main + New Southeast Worst-Case 1- Hr Con (µg/m <sup>3</sup> )	Monitored Background Concentration <sup>3</sup> (µg/m <sup>3</sup> )	National Ambient Air Quality Standard (µg/m <sup>3</sup> )
Nitrogen Oxides	20.82	14.08	97.00	188
Sulfur Dioxide	67.85	49.52	36.00	197
Fine Particulates	3.85	2.24	26.00	352
Carbon Monoxide	93.82	43.25	2,979	35,000

<sup>1</sup> Concentrations shown are worst-case at the CDC distance from each of the plants.

<sup>2</sup> Fine particulate matter standard is for a 3-hour averaging period.

<sup>3</sup> Background concentration is actual monitoring information and would include Southeast Plant’s actual impacts.

The maximum permitted one-hour emissions were modeled for both the old and the new system. It was assumed that all permitted boilers would operate at the same time. As shown, total impacts to the area near the plant, such as the University’s Child Development Center, will be reduced.